

Claims

1. A fastener comprising:
 - a shaft defining a shaft's longitudinal centerline;
 - a cam head disposed at one end of the shaft and having a cam's longitudinal centerline that is radially offset to the shaft's longitudinal centerline;
 - a clamp head disposed at an opposite end of the shaft, wherein the cam head and the clamp head are at opposite ends of the shaft; and
 - a radially expandable sleeve having an outside diameter that defines a sleeve's longitudinal centerline, wherein the radially expandable sleeve defines an oblong opening through which the shaft extends, wherein the shaft is radially movable within the oblong opening between a release position and a clamp position, wherein the sleeve's longitudinal centerline is radially offset to the shaft's longitudinal centerline when the shaft is in the release position, wherein the outer diameter of the radially expandable sleeve increases in response to the shaft moving radially from the release position to the clamp position.
2. The fastener of claim 1, wherein the radially expandable sleeve is rotatable to vary a radial offset between the sleeve's longitudinal centerline and the cam's longitudinal centerline.
3. The fastener of claim 1, wherein the cam head and the clamp head are spaced apart from each other at a substantially fixed distance.
4. The fastener of claim 1, wherein the radially expandable sleeve defines a slit that extends a full length of the radially expandable sleeve.

5. The fastener of claim 4, wherein the shaft moves toward the slit as the shaft moves from the release position to the clamp position.
6. The fastener of claim 1, further comprising a handle attached to the clamp head.
7. The fastener of claim 1, further comprising a handle attached to the cam head.
8. The fastener of claim 1, wherein the cam head includes an inclined cam surface that lies at an angle to the cam's longitudinal centerline.
9. The fastener of claim 1, wherein the cam head and the clamp head are substantially fixed relative to each other.
10. The fastener of claim 1, wherein the oblong opening has a shape that lies along an imaginary plane that is perpendicular to the sleeve's longitudinal centerline, wherein the shape has a narrower end and a wider end.
11. The fastener of claim 10, wherein the shape include a throat between the narrower end and the wider end, wherein the throat is narrower than the narrower end and the wider end.
12. The fastener of claim 1, wherein the radially expandable sleeve defines a slit that traverses the sleeve's longitudinal centerline and is interposed between two axially offset

portions of the radially expandable sleeve, wherein the two axially offset portions are able to radially expand independently of each other.

13. The fastener of claim 1, further comprising a plurality of irregularities distributed circumferentially around the cam head, wherein the plurality of irregularities help hold the shaft in the clamp position.

14. The fastener of claim 1, further comprising a lock pin that is axially movable relative to at least one of the clamp head and the cam head, wherein the lock pin is movable between a lock position where the lock pin helps hold the shaft in the clamp position and an unlock position where the lock pin allows the shaft to move to the release position.

15. The fastener of claim 1, further comprising an alignment mark disposed on at least one of the clamp head and the cam head, wherein the alignment mark helps align the radially expandable sleeve such that the fastener is in the release position.

16. A fastener, comprising:
a shaft defining a shaft's longitudinal centerline that extends in an axial direction;
a cam head disposed at one end of the shaft, wherein the cam head includes a cam surface;
a clamp head disposed at an opposite end of the shaft, wherein the clamp head includes an axial clamping surface; and
a sleeve interposed between the clamp head and the cam head, wherein the sleeve defines an opening through which the shaft extends, wherein the sleeve has a sleeve's outer diameter that defines an imaginary cylinder comprising an infinite plurality of parallel lines of which at least some define a plurality of line segments that terminate at

the axial clamping surface and the cam surface, wherein the plurality of line segments includes a shortest line segment, wherein the shortest line segment has a length that varies upon rotating the sleeve relative to the cam head and the clamp head, whereby the fastener is able to clamp in the axial direction upon rotating the clamp head and the cam head relative to the sleeve.

17. The fastener of claim 16, wherein the sleeve defines a sleeve's longitudinal centerline and the cam head defines a cam's longitudinal centerline, wherein the sleeve is rotatable to vary a radial offset between the sleeve's longitudinal centerline and the cam's longitudinal centerline.

18. The fastener of claim 16, wherein the sleeve defines a slit that extends a full length of the sleeve.

19. The fastener of claim 18, wherein the shaft is movable toward the slit to radially expand the sleeve.

20. The fastener of claim 16, wherein the cam surface lies at an angle to the shaft's longitudinal centerline.

21. The fastener of claim 16, wherein the cam head and the clamp head are substantially fixed relative to each other.

22. The fastener of claim 16, wherein the opening of the sleeve has an oblong shape that lies along an imaginary plane that is perpendicular to the shaft's longitudinal centerline, wherein the oblong shape has a narrower end and a wider end.
23. A method of clamping a fastener to a member, wherein the member defines a hole having an inner diameter, wherein the hole extends from a first surface of the member to a second surface of the member, the method comprising:
- inserting the fastener into the hole so that the fastener engages the first surface, the second surface, and the inner diameter of the hole;
 - expanding the fastener radially outward against the inner diameter; and
 - while expanding the fastener, simultaneously urging the first surface toward the second surface, wherein the step of expanding and simultaneously urging are achieved by rotating a portion of the fastener within a sleeve that defines an oblong hole.
24. The method of claim 23, wherein the sleeve defines a slit that extends a full length of the sleeve.